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(54) Title: CONDITIONING COMPOSITION COMPRISING CATIONIC CROSSLINKED POLYMER

(57) Abstract: Disclosed is a conditioning composition comprising by weight: (a) from about 0.01% to about 10% of a cationic crosslinked polymer having a crosslinked level of from about 50ppm to about 1,000ppm; (b) from about 0.1% to about 10% of a high melting point cationic surfactant; (c) from about 0.1% to about 20% of a high melting point fatty compound; and (d) an aqueous carrier. The conditioning composition of the present invention can provide conditioning benefits such as softness on wet substances. The conditioning compositions of the present invention can be used as hair conditioners, skin conditioners, and/or fabric softeners.

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CONDITIONING COMPOSITION COMPRISING CATIONIC CROSSLINKED POLYMER

Field of Invention

The present invention relates to a conditioning composition comprising a cationic crosslinked polymer, a cationic surfactant, and a high melting point fatty compound. The composition of the present invention can provide improved wet conditioning benefits.

Background of the Invention

A variety of conditioning compositions such as hair conditioning compositions, skin conditioning compositions, and fabric softeners have been used for hair, skin, and fabric respectively. A variety of approaches have been developed to condition the hair, skin, and fabric. A common method of providing conditioning benefit is through the use of conditioning agents such as cationic surfactants and polymers, high melting point fatty compounds, low melting point oils, silicone compounds, and mixtures thereof. Most of these conditioning agents are known to provide various conditioning benefits. For example, some cationic surfactants, when used together with some high melting point fatty compounds, are believed to provide a gel matrix which is suitable for providing a variety of conditioning benefits such as slippery feel on wet substances and softness and moisturized feel on the substances when they are dried. Such benefits on wet substances are desirable, for example, during the application.

It has been found that; there is a need for conditioning compositions which provide improved conditioning benefits such as softness on wet substance, while providing slippery feel on wet substances and softness and moisturized feel on the substances when they are dried.

Based on foregoing, there remains a need for conditioning compositions which provide improved conditioning benefits such as softness on wet substances, while providing slippery feel on wet substances and softness and moisturized feel on the substances when they are dried.

There further exists a need for conditioning compositions which are easy to rinse-off, when the compositions are in the form of rinse-off products.

None of the existing art provides all of the advantages and benefits of the present invention.

Summary of the Invention

The present invention is directed to a conditioning composition comprising by weight:

(a) from about 0.01% to about 10% of a cationic crosslinked polymer having a crosslinked level of from about 50ppm to about 1,000ppm;

(b) from about 0.1% to about 10% of a high melting point cationic surfactant;

(c) from about 0.1% to about 20% of a high melting point fatty compound; and

(d) an aqueous carrier.

The conditioning composition of the present invention can provide improved conditioning benefits such as softness on wet substances, while providing slippery feel on wet substances and softness and moisturized feel on the substances when they are dried.

These and other features, aspects, and advantages of the present invention will become better understood from a reading of the following description, and appended claims.

All documents cited are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention.

Detailed Description of the Invention

While the specification concludes with claims particularly pointing out and distinctly claiming the invention, it is believed that the present invention will be better understood from the following description.

Herein, "comprising" means that other steps and other ingredients which do not affect the end result can be added. This term encompasses the terms "consisting of" and "consisting essentially of".

All percentages, parts and ratios are based upon the total weight of the compositions of the present invention, unless otherwise specified. All such weights as they pertain to listed ingredients are based on the active level and, therefore, do not include carriers or by-products that may be included in commercially available materials.

Herein, "mixtures" is meant to include a simple combination of materials and any compounds that may result from their combination.

CATIONIC CROSSLINKED POLYMER

The compositions of the present invention comprise a cationic crosslinked polymer. The cationic crosslinked polymers are cationic polymers crosslinked by a crosslinking agent. The cationic crosslinked polymers useful herein have a crosslinked level of from about 50ppm to about 1,000ppm. In the present invention, "crosslinked level" means the amount of crosslinking agents of the total weight of the polymer on a weight/weight basis. Widely varying amounts of the crosslinking agents can be employed depending upon the properties desired in the final polymer,

e.g. viscosifying effect. The crosslinking agents comprise from about 50ppm to about 1,000ppm, preferably from about 50ppm to about 600ppm, more preferably from about 50ppm to about 250ppm of the total weight of the polymer on a weight/weight basis, in view of providing conditioning benefits such as slippery feel on wet substances.

The cationic crosslinked polymer can be included in the compositions of the present invention at a level by weight of preferably from about 0.01% to about 10%, more preferably from about 0.05% to about 7%, still more preferably from about 0.1% to about 5%.

It is believed that the cationic crosslinked polymer, when used together with cationic surfactants and high melting point fatty compounds, can provide improved conditioning benefits such as softness on wet substances, while providing slippery feel on wet substances and softness and moisturized feel on the substances when they are dried. It is also believed that cationic crosslinked polymer can provide benefits such as easiness to rinse-off.

Cationic crosslinked polymers useful herein include, for example, those comprising the monomer units and has the formula $(A)_m(B)_n(C)_p$ wherein: (A) is a quaternized dialkylaminoalkyl acrylate, an acid addition salt of a dialkylaminoalkyl acrylate, or mixtures thereof; (B) is a quaternized dialkylaminoalkyl methacrylate, an acid addition salt of a dialkylaminoalkyl methacrylate, or mixtures thereof; (C) is a nonionic monomer polymerizable with (A) or (B); m, n, and p are independently zero or greater, but at least one of m or n is one or greater.

The monomer (C) can be selected from any of the commonly used monomers. Non-limiting examples of these monomers include acrylamide; methacrylamide; acrylate esters and methacrylate esters such as methylmethacrylate, 2-ethylhexylmethacrylate, and t-butylacrylate; (meth)acrylamide derivatives such as N-isopropylacrylamide, N, N-dimethyl acrylamide; and styrene. In the present invention, the monomer (C) is preferably acrylamide.

The alkyl portions of the monomers (A) and (B) are preferably short chain length alkyls such as C_1-C_8, more preferably C_1-C_5, still more preferably C_1-C_3, even still more preferably C_1-C_2. When quaternized, the polymers are preferably quaternized with short chain alkyls, i.e., C_1-C_8, more preferably C_1-C_5, still more preferably C_1-C_3, even still more preferably C_1-C_2. The acid addition salts refer to polymers having protonated amino groups. Acid addition salts can be performed through the use of halogen (e.g. chloride), acetic, phosphoric, nitric, citric, or other acids. In the present invention, (A) is preferably a chloride salt of trialkylaminoethyl acrylate, and more preferably a chloride salt of trimethylaminoethyl acrylate. In the present invention, (B) is preferably a chloride salt of trialkylaminoethyl methacrylate, and more preferably a chloride salt of trimethylaminoethyl methacrylate.

When the polymer contains the monomer (C), the molar proportion of the monomer (C) can be up to about 80% based on the total molar proportions of the monomers (A), (B), and (C). The molar proportions of (A) and (B) can independently be from 0% to about 100%. When acrylamide is used as the monomer (C), it will preferably be included at a level of from about 5% to about 80%.

The crosslinked polymers also contain a crosslinking agent, which is typically a material containing two or more unsaturated functional groups. The crosslinking agent is reacted with the monomer units of the polymer and is incorporated into the polymer, forming either links or covalent bonds between two or more individual polymer chains or between two or more sections of the same polymer chain. Nonlimiting examples of suitable crosslinking agents include those selected from the group consisting of methylenebisacrylamides, diacrylates, dimethacrylates, di-vinyl aryl (e.g. di-vinyl phenyl ring) compounds, polyalkenyl polyethers of polyhydric alcohols, and allyl acrylates. Specific examples of crosslinking agents useful herein include those selected from the group consisting of methylenebisacrylamide, ethylene glycol di-(meth)acrylate, propylene glycol di-(meth)acrylate, butylene glycol di-(meth)acrylate, 1,4-di-ethylene benzene, and allyl acrylate. Preferred herein is methylenebisacrylamide.

Exemplary, the crosslinked polymers useful herein include those conforming to the general structure $(A)_m(B)_n(C)_p$ wherein m is zero, (B) is methyl quaternized dimethylaminoethyl methacrylate, (C) is acrylamide, and the crosslinking agent is methylenebisacrylamide. An example of such a crosslinking polymer is one that has the CTFA designation, "Polyquaternium 32".

More preferred cationic crosslinked polymers useful herein include those not containing acrylamide or other monomer (C), i.e. p is zero. In these polymers, the monomers (A) and (B) are as described above. An especially preferred group of these polymers is one in which m is also zero. In this instance, the polymer is essentially a homopolymer of dialkylaminoalkyl methacrylate monomer or its quaternary ammonium or acid addition salt. These dialkylaminoalkyl methacrylate copolymers and homopolymers also contain a crosslinking agent as described above.

Highly preferred cationic crosslinked polymer is a homopolymer which does not contain acrylamide or other monomer (C). The homopolymers useful herein can be those conforming to the general structure $(A)_m(B)_n(C)_p$ wherein m is zero, (B) is methyl quaternized dimethylaminoethyl methacrylate, p is zero, and the crosslinking agent is methylenebisacrylamide. An example of such a homopolymer is one that has the CTFA designation, "Polyquaternium 37". Commercially available such polyquaternium-37 useful

herein include, for example, the one available as a neat material, under the tradenames Synthalen CR, Synthalen CU, and Synthalen CN, all from 3V Sigma.

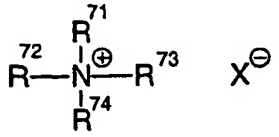
HIGH MELTING POINT CATIONIC SURFACTANT

The compositions of the present invention comprise a high melting point cationic surfactant. The high melting point cationic surfactant useful herein are those having a melting point of 25°C or higher. Cationic surfactant of low melting point, i.e., those having a melting point of less than 25°C are not intended to be included in this section.

The high melting point cationic surfactant is included in the composition at a level by weight of from about 0.1% to about 10%, preferably from about 0.5% to about 2.5%, more preferably from about 0.5% to about 1.5%, in view of leaving the substances with a clean feel, while maintaining conditioning benefits such as softness and slippery feel on wet substances and softness and moisturized feel on the dry substances.

The high melting point cationic surfactant, together with below high melting fatty compound, and an aqueous carrier, provides a gel matrix which is suitable for providing various conditioning benefits such as slippery and slick feel on wet substances, and softness, and moisturized feel on dry substances. In view of providing the above gel matrix, the high melting point cationic surfactant and the high melting point fatty compound are contained at a level such that the mole ratio of the high melting point cationic surfactant to the high melting point fatty compound is in the range of, preferably from about 1:1 to 1:10, more preferably from about 1:2 to 1:6. It is believed that this gel matrix provide, when used together with the above cationic crosslinked polymer having a crosslinked level of from about 50pm to about 1,000ppm, reduced sensitivity to additional components such as nonionic or cationic low melting point surfactant described below.

The high melting point cationic surfactants useful herein include, for example, those corresponding to the general formula (I):



(I)

wherein at least one of R^{71}, R^{72}, R^{73} and R^{74} is selected from an aliphatic group of from 8 to 30 carbon atoms or an aromatic, alkoxy, polyoxyalkylene, alkylamido, hydroxyalkyl, aryl or alkylaryl group having up to about 22 carbon atoms, the remainder of R^{71}, R^{72}, R^{73} and R^{74} are independently selected from an aliphatic group of from 1 to about 22 carbon atoms or an aromatic, alkoxy, polyoxyalkylene, alkylamido, hydroxyalkyl, aryl or alkylaryl group having up

to about 22 carbon atoms; and X is a salt-forming anion such as those selected from halogen, (*e.g.* chloride, bromide), acetate, citrate, lactate, glycolate, phosphate, nitrate, sulfonate, sulfate, alkylsulfate, and alkyl sulfonate radicals. The aliphatic groups can contain, in addition to carbon and hydrogen atoms, ether linkages, and other groups such as amino groups. The longer chain aliphatic groups, *e.g.*, those of about 12 carbons, or higher, can be saturated or unsaturated. Preferred is when R^{71}, R^{72}, R^{73} and R^{74} are independently selected from C_1 to about C_{22} alkyl. Nonlimiting examples of cationic surfactants useful in the present invention include the materials having the following CTFA designations: quaternium-8, quaternium-14, quaternium-18, quaternium-18 methosulfate, quaternium-24, and mixtures thereof.

Among the cationic surfactants of general formula (I), preferred are those containing in the molecule at least one alkyl chain having at least 16 carbons. Nonlimiting examples of such preferred cationic surfactants include: behenyl trimethyl ammonium chloride available, for example, with tradename Genamine KDMP from Clariant, with tradename INCROQUAT TMC-80 from Croda and ECONOL TM22 from Sanyo Kasei; cetyl trimethyl ammonium chloride available, for example, with tradename CA-2350 from Nikko Chemicals, hydrogenated tallow alkyl trimethyl ammonium chloride, dialkyl (14-18) dimethyl ammonium chloride, ditallow alkyl dimethyl ammonium chloride, dihydrogenated tallow alkyl dimethyl ammonium chloride, distearyl dimethyl ammonium chloride, dicetyl dimethyl ammonium chloride, di(behenyl/arachidyl) dimethyl ammonium chloride, dibehenyl dimethyl ammonium chloride, stearyl dimethyl benzyl ammonium chloride, stearyl propyleneglycol phosphate dimethyl ammonium chloride, stearoyl amidopropyl dimethyl benzyl ammonium chloride, stearoyl amidopropyl dimethyl (myristylacetate) ammonium chloride, and N-(stearoyl colamino formyl methyl) pyridinium chloride.

Salts of tertiary fatty amines are also suitable for high melting point cationic surfactants. The alkyl groups of such amines preferably have from about 12 to about 22 carbon atoms, and can be substituted or unsubstituted. Particularly useful are amidoamines of the following general formula:

$$R^1\,CONH\,(CH_2)_m\,N\,(R^2)_2$$

wherein R^1 is a residue of C_{11} to C_{24} fatty acids, R^2 is a C_1 to C_4 alkyl, and m is an integer from 1 to 4.

Preferred amidoamine useful in the present invention includes stearamidopropyldimethylamine, stearamidopropyldiethylamine, stearamidoethyldiethylamine, stearamidoethyldimethylamine, palmitamidopropyldimethylamine,

palmitamidopropyldiethylamine, palmitamidoethyldiethylamine, palmitamidoethyldimethylamine, behenamidopropyldimethylamine, behenamidopropyldiethylamine, behenamidoethyldiethylamine, behenamidoethyldimethylamine, and mixtures thereof; more preferably stearamidopropyldimethylamine, stearamidoethyldiethylamine, and mixtures thereof.

The amidoamines herein are preferably used in combination with acids selected from the group consisting of L-glutamic acid, lactic acid, hydrochloric acid, malic acid, succinic acid, acetic acid, fumaric acid, L-glutamic acid hydrochloride, tartaric acid, citric acid, and mixtures thereof; preferably L-glutamic acid, lactic acid, hydrochloric acid, and mixtures thereof. Preferably, the mole ratio of amidoamine to acid is from about 1:0.3 to about 1:2, more preferably from about 1:0.5 to about 1:1.3.

HIGH MELTING POINT FATTY COMPOUND

The conditioning composition of the present invention comprises a high melting point fatty compound. The high melting point fatty compound is included in the composition at a level of from about 0.1% to about 20%, preferably from about 1% to about 10%, still more preferably from about 1% to about 4% by weight of the composition, in view of leaving the substances with a clean feel, while maintaining conditioning benefits such as softness and slippery feel on wet substances and softness and moisturized feel on the dry substances

The high melting point fatty compound useful herein have a melting point of 25°C or higher, and is selected from the group consisting of fatty alcohols, fatty acids, fatty alcohol derivatives, fatty acid derivatives, and mixtures thereof. It is understood by the artisan that the compounds disclosed in this section of the specification can in some instances fall into more than one classification, *e.g.*, some fatty alcohol derivatives can also be classified as fatty acid derivatives. However, a given classification is not intended to be a limitation on that particular compound, but is done so for convenience of classification and nomenclature. Further, it is understood by the artisan that, depending on the number and position of double bonds, and length and position of the branches, certain compounds having certain required carbon atoms may have a melting point of less than 25°C. Such compounds of low melting point are not intended to be included in this section. Nonlimiting examples of the high melting point compounds are found in International Cosmetic Ingredient Dictionary, Fifth Edition, 1993, and CTFA Cosmetic Ingredient Handbook, Second Edition, 1992.

Among a variety of high melting point fatty compounds, fatty alcohols are preferably used in the composition of the present invention. The fatty alcohols useful herein are those having from about 14 to about 30 carbon atoms, preferably from about 16 to about 22 carbon

atoms. These fatty alcohols are saturated and can be straight or branched chain alcohols. Nonlimiting examples of fatty alcohols include; cetyl alcohol, stearyl alcohol, behenyl alcohol, and mixtures thereof.

High melting point fatty compounds of a single compound of high purity are preferred. Single compounds of pure fatty alcohols selected from the group of pure cetyl alcohol, stearyl alcohol, and behenyl alcohol are highly preferred. By "pure" herein, what is meant is that the compound has a purity of at least about 90%, preferably at least about 95%. These single compounds of high purity provide good rinsability from the substances when the consumer rinses off the composition.

Commercially available high melting point fatty compounds useful herein include: cetyl alcohol, stearyl alcohol, and behenyl alcohol having tradenames KONOL series available from Shin Nihon Rika (Osaka, Japan), and NAA series available from NOF (Tokyo, Japan); pure behenyl alcohol having tradename 1-DOCOSANOL available from WAKO (Osaka, Japan).

AQUEOUS CARRIER

The conditioning composition of the present invention comprises an aqueous carrier. The level and species of the carrier are selected according to the compatibility with other components, and other desired characteristic of the product.

The carrier useful in the present invention includes water and water solutions of lower alkyl alcohols and polyhydric alcohols. The lower alkyl alcohols useful herein are monohydric alcohols having 1 to 6 carbons, more preferably ethanol and isopropanol. The polyhydric alcohols useful herein include propylene glycol, hexylene glycol, glycerin, and propane diol.

Preferably, the aqueous carrier is substantially water. Deionized water is preferably used. Water from natural sources including mineral cations can also be used, depending on the desired characteristic of the product. Generally, the compositions of the present invention comprise from about 20% to about 99%, preferably from about 30% to about 95%, and more preferably from about 80% to about 95% water.

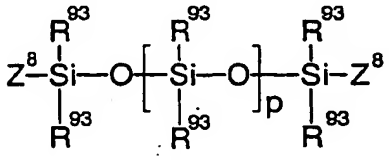
SILICONE COMPOUND

Preferably, the compositions of the present invention preferably contain a silicone compound. It is believed that the silicone compound can provide smoothness and softness on dry substances. The silicone compounds may further be incorporated in the present composition in the form of an emulsion, wherein the emulsion is made my mechanical mixing, or in the stage of synthesis through emulsion polymerization, with or without the aid of a surfactant selected from anionic surfactants, nonionic surfactants, cationic surfactants, and mixtures thereof.

The silicone compounds herein are preferably used at levels by weight of the composition of from about 0.1% to about 20%, more preferably from about 0.1% to about 10%, still more preferably from about 0.1% to about 5%.

The silicone compounds useful herein, as a single compound, or as a blend or mixture of at least two compounds, have a viscosity of preferably from about 1,000 to about 2,000,000 centistokes at 25°C, more preferably from about 10,000 to about 1,800,000, and even more preferably from about 100,000 to about 1,500,000. The viscosity can be measured by means of a glass capillary viscometer as set forth in Dow Corning Corporate Test Method CTM0004, July 20, 1970. Suitable silicone fluids include polyalkyl siloxanes, polyaryl siloxanes, polyalkylaryl siloxanes, polyether siloxane copolymers, amino substituted silicones, quaternized silicones, and mixtures thereof. Other nonvolatile silicone compounds having conditioning properties can also be used.

The silicone compounds useful herein include polyalkyl or polyaryl siloxanes with the following structure:



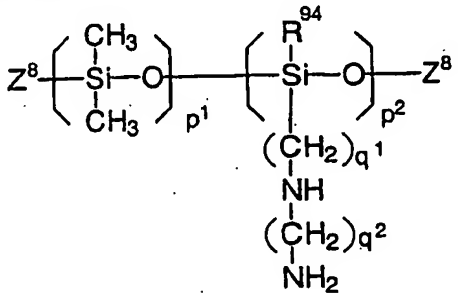
wherein R^{93} is alkyl or aryl, and x is an integer from about 7 to about 8,000. Z^8 represents groups which block the ends of the silicone chains. The alkyl or aryl groups substituted on the siloxane chain (R^{93}) or at the ends of the siloxane chains Z^8 can have any structure as long as the resulting silicone remains fluid at room temperature, is dispersible, is neither irritating, toxic nor otherwise harmful when applied to the substances, is compatible with the other components of the composition, is chemically stable under normal use and storage conditions, and is capable of being deposited on and conditions the substances. Suitable Z^8 groups include hydroxy, methyl, methoxy, ethoxy, propoxy, and aryloxy. The two R^{93} groups on the silicon atom may represent the same group or different groups. Preferably, the two R^{93} groups represent the same group. Suitable R^{93} groups include methyl, ethyl, propyl, phenyl, methylphenyl and phenylmethyl. The preferred silicone compounds are polydimethylsiloxane, polydiethylsiloxane, and polymethylphenylsiloxane. Polydimethylsiloxane, which is also known as dimethicone, is especially preferred. The polyalkylsiloxanes that can be used include, for example, polydimethylsiloxanes. These silicone compounds are available, for example, from the General Electric Company in their Viscasil® and SF 96 series, and from Dow Corning in their Dow Corning 200 series.

The silicone compounds useful herein also include a silicone gum. The term "silicone gum", as used herein, means a polyorganosiloxane material having a viscosity at 25°C of greater than or equal to 1,000,000 centistokes. It is recognized that the silicone gums described herein can also have some overlap with the above-disclosed silicone compounds. This overlap is not intended as a limitation on any of these materials. The "silicone gums" will typically have a mass molecular weight in excess of about 200,000, generally between about 200,000 and about 1,000,000. Specific examples include polydimethylsiloxane, poly(dimethylsiloxane methylvinylsiloxane) copolymer, poly(dimethylsiloxane diphenylsiloxane methylvinylsiloxane) copolymer and mixtures thereof.

The above silicone compounds such as polyalkylsiloxanes and silicone gums are available, for example, as a mixture with silicone compounds having a lower viscosity. Such mixtures useful herein include, for example, Gum/Cyclomethicone blend available from Shin-Etsu, and blend of dimethicone having a viscosity of 500,000mPa•s and dimethicone having a viscosity of 200mPa•s available from GE Toshiba

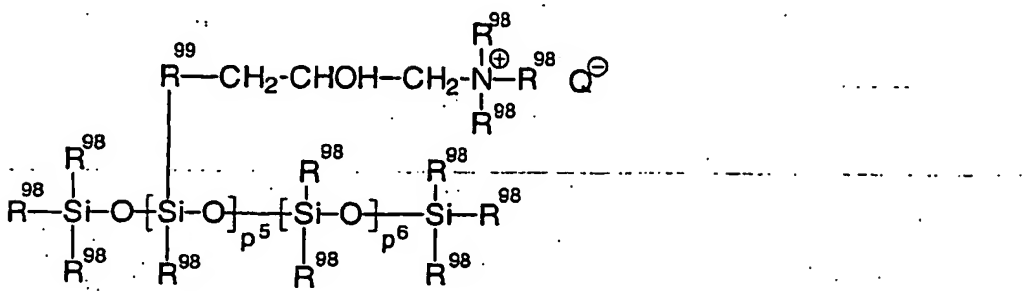
The silicone compounds that can be used include, for example, a polypropylene oxide modified polydimethylsiloxane although ethylene oxide or mixtures of ethylene oxide and propylene oxide can also be used. The ethylene oxide and polypropylene oxide level should be sufficiently low so as not to interfere with the dispersibility characteristics of the silicone. These materials are also known as dimethicone copolyols.

Silicone compounds useful herein also include amino substituted materials. Suitable alkylamino substituted silicone compounds include those represented by the following structure:



wherein R^{94} is H, CH_3 or OH; p^1 and p^2 are integers of 1 or above, and wherein sum of p^1 and p^2 is from 650 to 1,500; q^1 and q^2 are integers of from 1 to 10. Z^8 represents groups which block the ends of the silicone chains. Suitable Z^8 groups include hydroxy, methyl, methoxy, ethoxy, propoxy, and aryloxy. Highly preferred are those known as "amodimethicone". Commercially available amodimethicones useful herein include, for example, BY16-872 available from Dow Corning.

Other amino substituted silicone polymers which can be used are represented by the formula:



where R^{98} denotes a monovalent hydrocarbon radical having from 1 to 18 carbon atoms, preferably an alkyl or alkenyl radical such as methyl; R^{99} denotes a hydrocarbon radical, preferably a C_1-C_{18} alkylene radical or a C_1-C_{18}, and more preferably C_1-C_8, alkyleneoxy radical; Q^- is a halide ion, preferably chloride; p^5 denotes an average statistical value from 2 to 20, preferably from 2 to 8; p^6 denotes an average statistical value from 20 to 200, and preferably from 20 to 50. A preferred polymer of this class is available from Union Carbide under the name "UCAR SILICONE ALE 56."

LOW MELTING POINT SURFACTANT

The composition of the present invention may further contain a low melting point surfactant which is selected from nonionic surfactants, cationic surfactants, and mixtures thereof, in view of adjusting rheology and providing slippery feel on wet substances. Low melting point surfactants useful herein are those having a melting point of less than 25°C. The low melting point surfactant can be contained in the composition at a level by weight of preferably from about 0.01% to about 5%, more preferably from about 0.05% to about 2%.

Nonionic low melting point surfactants useful herein include, for example, polysorbates such as polysorbate-20, polysorbate-21, polysorbate-40, polysorbate-60. Cationic low melting point surfactants useful herein include, for example, cocamines such as PEG-5 cocamine.

ADDITIONAL COMPONENTS

The composition of the present invention may include other additional components, which may be selected by the artisan according to the desired characteristics of the final product and which are suitable for rendering the composition more cosmetically or aesthetically acceptable or to provide them with additional usage benefits. Such other additional components generally are used individually at levels of from about 0.001% to about 10%, preferably up to about 5% by weight of the composition.

PRODUCT FORMS

The conditioning compositions of the present invention can be in the form of rinse-off products or leave-on products, can be transparent or opaque, and can be formulated in a wide variety of product forms, including but not limited to creams, gels, emulsions, mousses and sprays.

The conditioning compositions of the present inventions can be used for conditioning a variety of substances such as hair, skin, and fabric, by applying the compositions to the substances such as hair, skin, and fabric. The conditioning composition of the present invention is especially suitable for hair care products such as hair conditioners, skin care products such as skin conditioners, and fabric care products such as fabric softeners.

EXAMPLES

The following examples further describe and demonstrate embodiments within the scope of the present invention. The examples are given solely for the purpose of illustration and are not to be construed as limitations of the present invention, as many variations thereof are possible without departing from the spirit and scope of the invention. Where applicable, ingredients are identified by chemical or CTFA name, or otherwise defined below.

[Compositions]

Components	Ex.1	Ex.2	Ex.3	Ex.4	Ex.5	Ex.6	Ex.7	Ex.8
Cationic crosslinked polymer-1 *1	2.0	1.0	2.0	1.0	-	2.0	2.0	2.0
Cationic crosslinked polymer-2 *2	-	-	-	-	1.0	-	-	-
Stearamidopropyl dimethylamine *3	1.0	1.6	1.0	1.6	1.6	1.6	-	1.0
ℓ-Glutamic acid *4	0.4	0.9	0.6	0.58	0.58	0.4	-	0.4
Behentrimonium chloride *5	-	-	-	-	-	-	1.7	-
Cetyl alcohol *6	1.25	2.0	1.25	2.0	2.0	1.25	1.16	1.25
Stearyl alcohol *7	2.25	3.6	2.25	3.6	3.6	2.25	2.09	2.25
Dimethicone/Cyclomethicone *8	4.2	4.2	-	-	4.2	2.0	-	-
Dimethicone blend *9	-	-	4.2	2.1	-	-	4.2	-
Aminosilicone *10	-	-	-	0.5	-	-	-	-
Polysorbate-20 *11	1.053	-	-	-	-	1.053	1.0	1.0
PEG-5 cocamine *12	-	1.0	1.0	-	-	-	-	-
PPG-34 *13	-	-	-	-	-	0.5	-	-
Poly-α-olefin oil*14	-	-	-	-	-	1.0	-	-

Benzyl alcohol	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Perfume	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Panthenol *15	0.05	-	-	0.05	0.05	0.05	0.05	0.05
Panthenyl ethyl ether *16	0.05	-	-	0.05	0.05	0.05	0.05	0.05
Hydrolyzed collagen *17	-	-	-	0.01	0.01	0.01	0.01	0.01
Vitamin E *18	-	-	-	0.01	0.01	0.01	0.01	0.01
Octyl methoxycinnamate	-	-	-	0.09	0.09	0.09	0.09	0.09
Benzophenone-3	-	-	-	0.09	0.09	0.09	0.09	0.09
Acid EDTA	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Deionized Water	q.s. to 100%							

Definitions of Components

*1 Cationic crosslinked polymer-1: Polyquaternium-37 available from 3V Sigma with a tradename Synthalen CR

*2 Cationic crosslinked polymer-2: Polyquaternium-37 available from 3V Sigma with a tradename Synthalen CN

*3 Stearamidopropyl dimethylamine: Amidoamine MPS available from Nikko.

*4 ℓ-Glutamic acid: ℓ-Glutamic acid (cosmetic grade) available from Ajinomoto.

*5 Behentrimonium chloride: Genamin KDMP available from Clariant

*6 Cetyl alcohol: Konol series available from Shin Nihon Rika.

*7 Stearyl alcohol: Konol series available from Shin Nihon Rika.

*8 Cyclomethicone/Dimethicone: Gum/Cyclomethicone blend available from Shin-Etsu

*9 Dimethicone blend: blend of dimethicone having a viscosity of 500,000mPa•s and dimethicone having a viscosity of 200mPa•s available from GE Toshiba

*10 Aminosilicone: BY16-872 available from Dow Corning

*11 Polysorbate-20: Glycosperse L-20K available from Lonza

*12 PEG-5 cocamine: Varonic K-205 available from Degussa

*13 PPG-34: New Pol PP-2000 available from Sanyo Kasei.

*14 Poly- α -olefin oil: Puresyn 100 available from Exxon Mobil

*15 Panthenol: Available from Roche.

*16 Panthenyl ethyl ether: Available from Roche.

*17 Hydrolyzed collagen: Peptein 2000 available from Hormel.

*18 Vitamin E: Emix-d available from Eisai.

Method of Preparation

The conditioning compositions of "Ex. 1" through "Ex. 8" as shown above can be prepared by any conventional method well known in the art. They are suitably made as follows:

Cationic crosslinked polymers, and if included, other polymeric materials are dissolved or dispersed in water at room temperature, with vigorous agitation, and heated to about 80°C. Cationic surfactants and high melting point fatty compounds are added to the mixture with agitation. The mixture is cooled down to about 55°C. If included, silicone compounds, perfumes, preservatives are added to the mixture with agitation. If included, nonionic surfactants are also added with agitation. Then the mixture is cooled down to room temperature.

Examples 1 through 8 are conditioning compositions of the present invention which are particularly useful for hair conditioner for rinse-off use. The embodiments disclosed and represented by the previous "Ex. 1" through "Ex. 8" have many advantages. For example, they can provide improved conditioning benefits such as softness on wet substances, while providing slippery feel on wet substances and softness and moisturized feel on the substances when they are dried. They can also be easy to rinse-off, when the compositions are in the form of rinse-off products.

What is claimed is:

1. A conditioning composition comprising by weight:
   (a) from about 0.01% to about 10% of a cationic crosslinked polymer having a crosslinked level of from about 50ppm to about 1,000ppm;
   (b) from about 0.1% to about 10% of a high melting point cationic surfactant;
   (c) from about 0.1% to about 20% of a high melting point fatty compound; and
   (d) an aqueous carrier.

2. The conditioning composition of Claim 1 wherein the cationic crosslinked polymer is a homopolymer of methyl quaternized dimethylaminoethyl methacrylate crosslinked by a crosslinking agent.

3. The conditioning composition of Claim 1 wherein the cationic surfactant is that comprising:

an amidoamine having the following general formula:

$$R^1 CONH (CH_2)_m N (R^2)_2$$

wherein R^1 is a residue of C_{11} to C_{24} fatty acids, R^2 is a C_1 to C_4 alkyl, and m is an integer from 1 to 4; and

an acid selected from the group consisting of L-glutamic acid, lactic acid, hydrochloric acid, malic acid, succinic acid, acetic acid, fumaric acid, L-glutamic acid hydrochloride, tartaric acid, citric acid, and mixtures thereof.

4. The conditioning composition of Claim 1 further comprising from about 0.1% to about 20% of a silicone compound.

5. The conditioning composition of Claim 1 further comprising from about 0.01% to about 5% of a low melting point surfactant which is selected from nonionic surfactants, cationic surfactants, and mixtures thereof.

6. The conditioning composition of Claim 1 comprising by weight:
   (a) from about 0.01% to about 10% of a cationic crosslinked polymer having a crosslinked level of from about 50ppm to about 600ppm;

(b) from about 0.1% to about 10% of a high melting point cationic surfactant;

(c) from about 0.1% to about 20% of a high melting point fatty compound; and

(d) an aqueous carrier;

(e) from about 0.1% to about 20% of a silicone compound;

(f) from about 0.01% to about 5% of a low melting point surfactant which is nonionic or cationic.

7. A method of conditioning hair, skin, and/or fabric by applying the conditioning composition of any of Claims 1-6 to the hair, skin, and/or fabric.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/31282

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 A61K7/075

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 A61K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, CHEM ABS Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01 76543 A (SNYDER MICHAEL ALBERT ;OHTSU KUMIKO (JP); SOMEYA KAZUYOSHI (JP); P) 18 October 2001 (2001-10-18) claims 1,9,11,15 page 9, line 21 -page 12, line 22 page 13, line 12 -page 17, line 17 page 20, line 19 -page 26, line 16 page 40, line 1 -page 47, line 17 examples 1-6,8,9,11,12 page 2, line 15 - line 24	1-7
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 January 2004	04/02/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Krattinger, B

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 03/31282

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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X	DE 199 36 910 A (SCHWARZKOPF GMBH HANS) 8 February 2001 (2001-02-08) examples 1,3,5	1,2,5-7
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X	US 5 756 076 A (LOPEZ JUAN ET AL) 26 May 1998 (1998-05-26) example 1 column 1, line 34 - line 39 column 1, line 59 - line 64	1,2,4-7

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Information on patent family members

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PCT/US 03/31282

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